

CLAIMS

1. A method for producing 1,3-propanediol, which comprises:

reacting an allyl alcohol with an alcohol compound in the presence of a catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table, to thereby obtain 3-alkoxy-1-propanol, and

10 hydrolyzing the 3-alkoxy-1-propanol at a temperature of lower than 200°C in the presence of at least one acid catalyst.

2. A method for producing 3-alkoxy-1-propanol, which comprises reacting an allyl alcohol with an alcohol compound in the presence of a catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table.

3. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table is an oxide.

4. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table is selected from the group consisting of scandium oxide, yttrium oxide, lanthanum oxide, samarium oxide, ytterbium oxide, neodymium oxide and lutetium oxide.

5. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table is an alkoxide compound.

6. The method for producing 3-alkoxy-1-propanol according to claim 5, wherein the catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table is selected from the group consisting of scandium trimethoxide, scandium triethoxide, scandium triisopropoxide, yttrium trimethoxide, yttrium triethoxide, yttrium triisopropoxide, ytterbium trimethoxide, ytterbium 10 triethoxide and ytterbium triisopropoxide.

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15 7. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table is supported on a carrier.

8. The method for producing 3-alkoxy-1-propanol according to claim 7, wherein the carrier is either activated carbon or magnesia.

20 9. The method for producing 3-alkoxy-1-propanol according to claim 8, wherein a specific surface area of the carrier is 1000 m²/g or more.

25 10. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the reaction of the allyl alcohol and the alcohol compound is carried out by a gas phase method.

30 11. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the alcohol compound to be reacted with the allyl alcohol is at least one selected from the group consisting of methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, t-butanol, allyl alcohol, phenol and benzyl alcohol.

35 12. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the reaction of the allyl alcohol and the alcohol compound is carried out in the presence of water.

13. The method for producing 3-alkoxy-1-propanol

according to claim 12, wherein the amount of water present in the reaction system is not less than the number of moles of elements in the catalyst containing at least one element selected from the group consisting of elements of the group III, lanthanoid elements and actinoid elements of the Periodic Table.

14. The method for producing 3-alkoxy-1-propanol according to claim 2, wherein the yield of 3-alkoxy-1-propanol is 0.5 or more per 1 mmol of metal used as the catalyst per one hour of the reaction time.

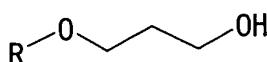
15. 3-alkoxy-1-propanol produced by the method according to claim 2.

16. A method for producing 1,3-propanediol, which comprises hydrolyzing an ether alcohol compound represented by the general formula (1) at a temperature of lower than 200°C in the presence of at least one acid catalyst:

General Formula (1)

(Chemical Formula 1)

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wherein R represents an alkyl group having 1 to 10 carbon atoms, a cycloalkyl group, or an aryl group, provided that R has no hydroxyl group.

25 17. The method for producing 1,3-propanediol according to claim 16, wherein the acid catalyst is a mineral acid.

18. The method for producing 1,3-propanediol according to claim 16, wherein the acid catalyst is an inorganic solid acid.

19. The method for producing 1,3-propanediol according to claim 16, wherein the acid catalyst is a compound having a sulfonic acid group.

30 20. The method for producing 1,3-propanediol according to claim 19, wherein the compound having a

sulfonic acid group is at least one selected from the group consisting of methanesulfonic acid, trifluoromethanesulfonic acid, p-toluenesulfonic acid, dodecylbenzenesulfonic acid and sulfonic acid type ion-exchange resin.

5 21. The method for producing 1,3-propanediol according to claim 16, wherein the acid catalyst is soluble in the reaction system and the reaction occurs in a homogeneous state.

10 22. The method for producing 1,3-propanediol according to claim 16, wherein the acid catalyst is insoluble in the reaction system and the reaction occurs in a heterogeneous state.

15 23. The method for producing 1,3-propanediol according to claim 16, wherein at least one compound selected from the group consisting of sodium iodide, potassium iodide, hydroiodic acid and tetraalkylammonium iodides is used as an reaction auxiliary.

20 24. The method for producing 1,3-propanediol according to claim 16, wherein the substituent R of the ether alcohol compound represented by the general formula (1) is a hydrocarbon having 7 or less carbon atoms.

25 25. The method for producing 1,3-propanediol according to claim 16, wherein the ether alcohol compound represented by the general formula (1) is at least one selected from the group consisting of 3-methoxy-1-propanol, 3-ethoxy-1-propanol, 3-propoxy-1-propanol, 3-allyloxy-1-propanol and 3-benzyloxy-1-propanol.

30 26. The method for producing 1,3-propanediol according to claim 16, wherein the ether alcohol compound represented by the general formula (1) is produced by reacting an allyl alcohol with an alcohol compound.

35 27. The method for producing 1,3-propanediol according to claim 16, wherein the hydrolysis reaction is carried out in the presence of water, the mass of which is not more than 5 times the mass of the ether alcohol compound.

28. 1,3-propanediol produced by the method according to claim 16.